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(54) A fastener such as a reinforcing grommet

(57) A fastener, such as a fastener for laminated materials, or a reinforcing grommet for cloth materials, comprises a tubular portion (10) which is intended to extend through a hole made in the material (22) and flange portions (12, 24) on either side of the material. The material is positioned intermediate the flange portions, an annular area being arranged to press against the surface of the material to form a frictional bond. This surface is formed on a part (1) which is provided with pin-shaped prongs arranged to be pressed through the material (22) by the force exerted by the flange portions, whereby a positive bond will also be obtained. An anchoring ring (4) is arranged to be positioned on the opposite side of the material (22) in relation to the part (1) provided with the prongs. This ring is made from a material having a hardness and a thickness as compared with the material of the prongs and the length of the latter that as a result of the pressure exerted by the flange portions (12, 24) they may be made to pierce the material of the anchoring ring. Consequently, the anchoring force holding the outermost portions of said prongs is obtained from the material of the anchoring ring (4), which material, when pierced through, is pressed against the surface of the prongs.

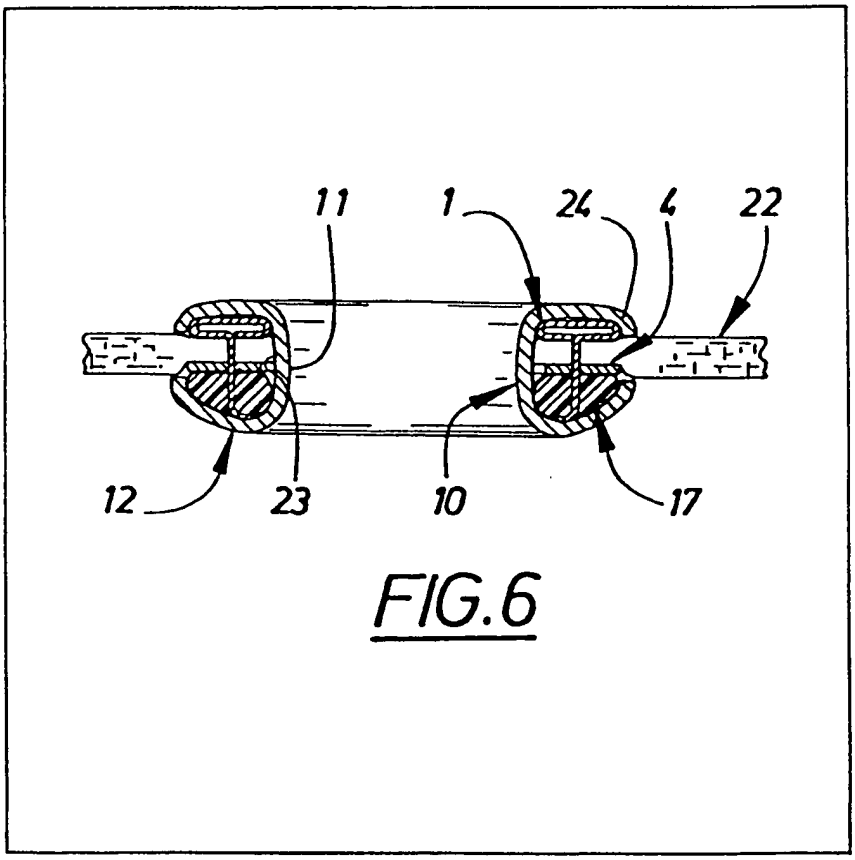

FIG.6

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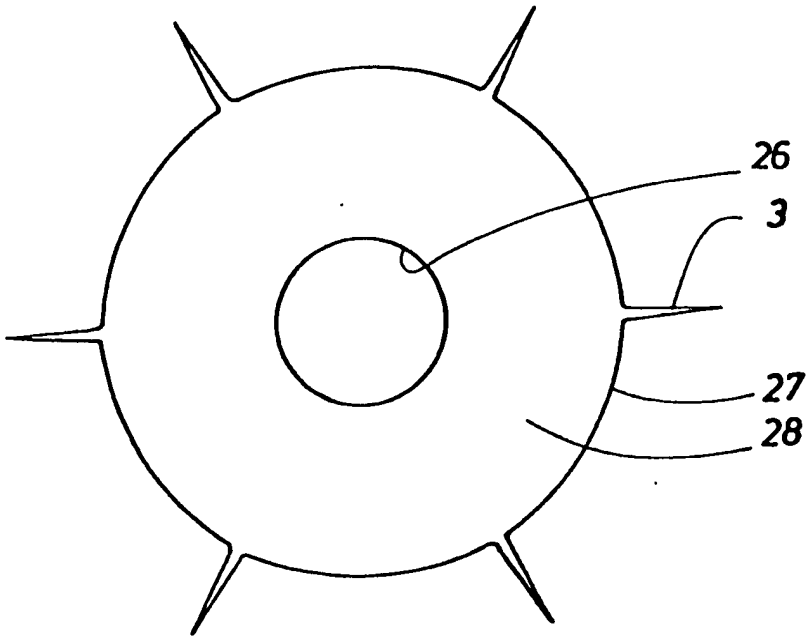

FIG. 1

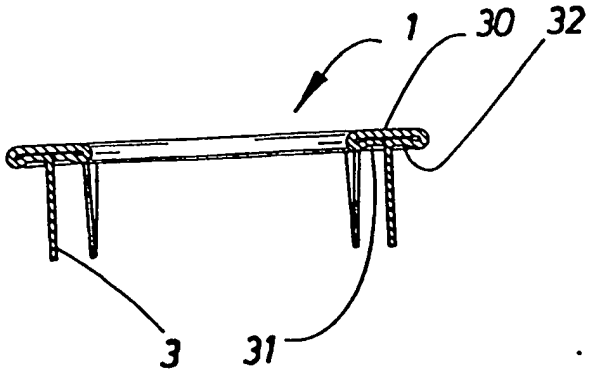

FIG. 2

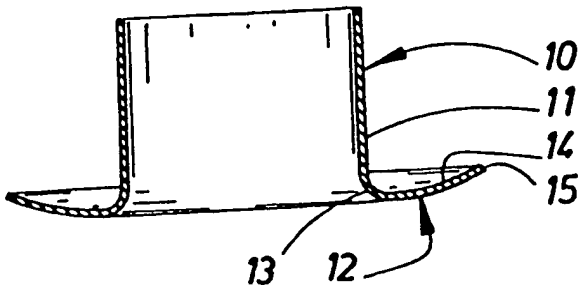

FIG.3

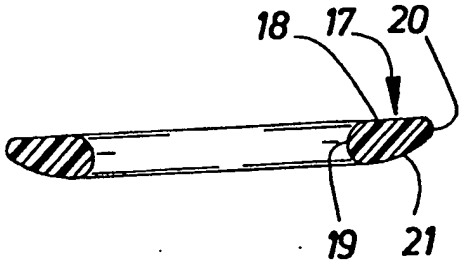

FIG.4

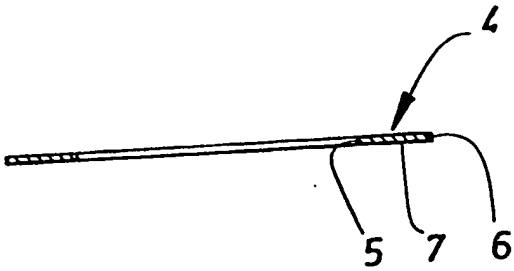

FIG.5

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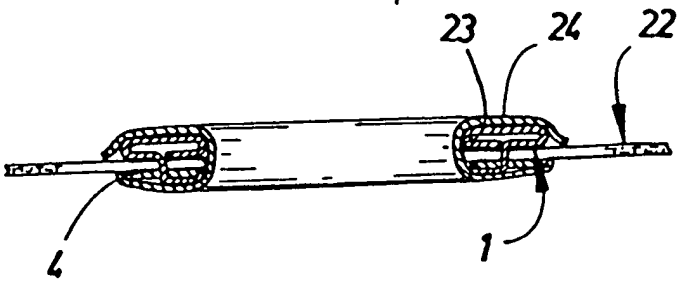

FIG. 12

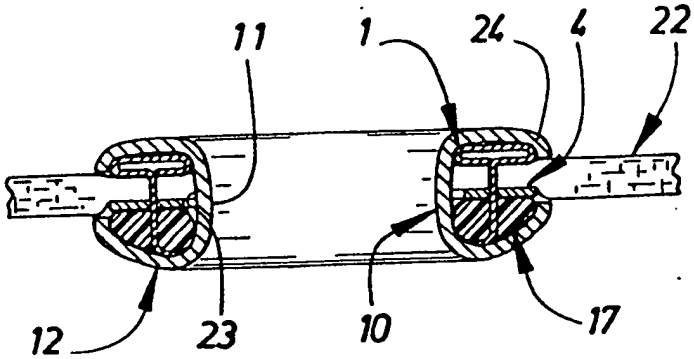

FIG.6

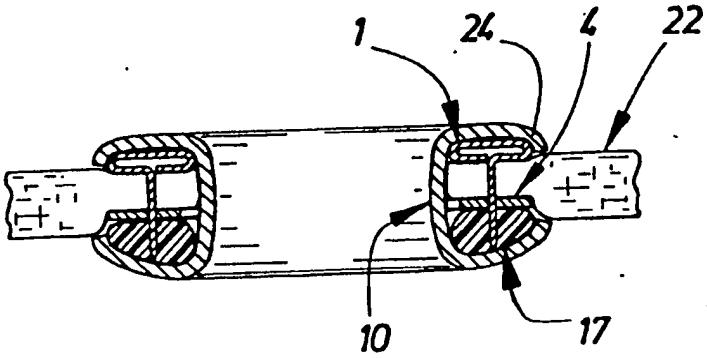

FIG.7

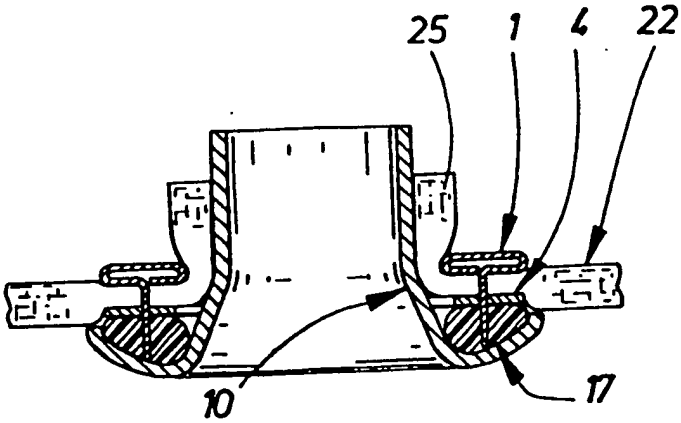

FIG.8

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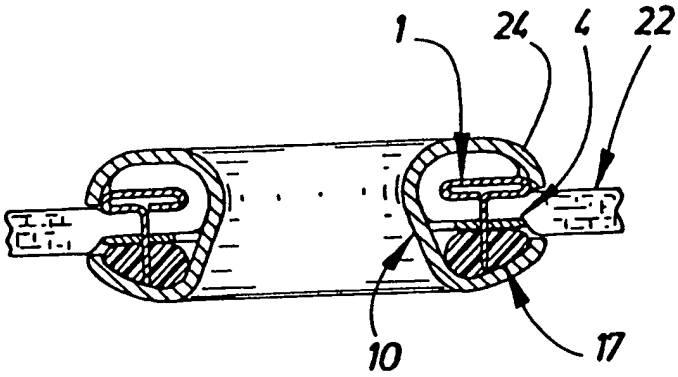

FIG.9

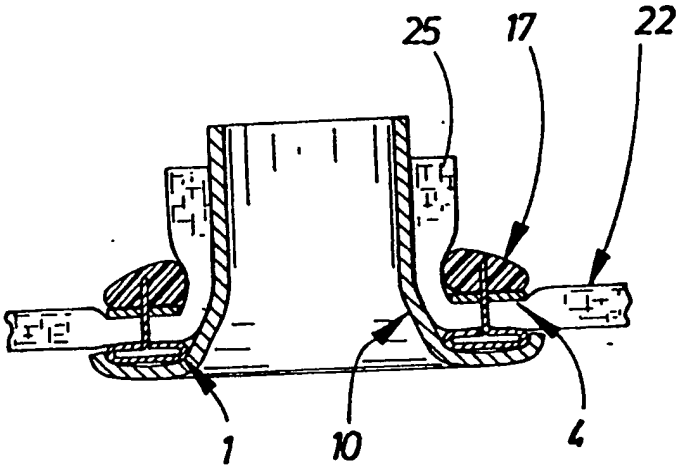

FIG.10

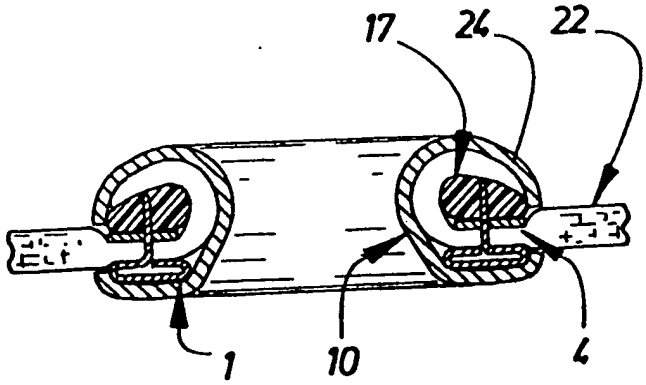

FIG.11

SPECIFICATION

A fastener such as a reinforcing grommet

The subject invention relates to a fastener for cloths, such as canvas, or other thin materials, and particularly to a fastener in the shape of a reinforcing grommet of the type comprising a tubular portion which is intended to extend through a hole formed in the material and flange portions on either side of the material between which flange portions is frictionally clamped the material immediately surrounding said hole, and pin-shaped prongs formed on an annular surface and arranged to be pressed through the material by the force exerted by said flange portions.

In cloths, e.g. sail canvas or canvas for covers, fasteners of different types are used. A fastener which is commonly used is a reinforcing grommet which is anchored on the canvas surface and forms an aperture through which a rope may be drawn. Alternatively, the fastener may be in the form of one half of a press stud, a clincher or some form of lock. Similar fasteners may also be used in connection with laminated materials, e.g. plywood or plastics.

In many cases fasteners of the kind referred to are exposed to severe forces. This is particularly true in the case of sail canvas, tent canvas and covers for vehicles. In such cases the requirements that the fastener be properly anchored in the canvas are very strict. It is impossible to use only a hole to anchor the fastener in the canvas in such cases. Instead, the fastener must be securely bonded to a surface of the cloth at the point of attachment, usually an annular surface surrounding a hole formed in the canvas. It is more or less an absolute requirement to use a hole if the fastener is to comprise two portions, one on either side of the canvas. In addition, many fasteners, such as rings, are formed with a through-hole. Fasteners which are capable of withstanding considerable forces without loosening or without the canvas being damaged are already known. In one common fastener which is designed to withstand medium stress, a sleeve is flanged outwards about the edge of a hole formed in the canvas on either side of the cloth and is compressed with great force, whereby the canvas area about the hole will be retained in position by friction. However, in the case of sails and large tents this arrangement to secure the fastener in the canvas has proved inadequate, particularly when used with very thick canvas cloths having high tearing strength. For this reason another type a fastener has been developed in which the loosening forces to which the cloth may be exposed are increased in that not only frictional forces are made use of but also positive anchoring forces by means of toothed rings, the teeth of which, upon compression of the sleeve, are forced into the canvas surface. When the canvas is exposed to considerable stress there is, however, a risk that the canvas is torn away from the teeth as the latter are bent outwards and for this reason it has been suggested, e.g. in US PS 959 308, to provide anchorage for the outer ends of the teeth. In accordance with this patent specification this is obtained by the engagement of the teeth apices in a support ring formed with punched recesses in which the teeth are supported. However, also this type of anchoring means has proved insufficient when exposed to extremely large stress, since the teeth apices may be pulled out of their supports. In addition, manufacturing problems are encountered because the ring from which the teeth project and the ring in which the recesses or similar indentations are formed necessarily must be in alignment. In case of disalignment, resulting in the teeth not being properly received in their anchoring supports, the associated ring fails to provide any anchoring effect at all. This is a considerable safety risk, since the bond cannot be checked once the mounting of the fastener has been completed.

The purpose of the invention is to provide a fastener for cloths such as canvas and other thin materials, which is capable of withstanding considerable stress and which does not suffer from the drawbacks outlined above found in prior-art fasteners.

An additional purpose is to provide a device which may be adapted to cloths of widely varying thickness.

Yet another purpose of the invention is to provide a fastener having a flanged sleeve which is designed to essentially eliminate the risk of damaging the canvas, e.g. by cutting through it during the sleeve-flanging operation.

The purposes of the invention are obtained in a fastener which is characterized in that an anchoring ring is arranged to be positioned on the side of the material opposite the surface formed with the prongs, said anchoring ring being made from a material having a hardness and a thickness in relation to the material of the prongs and the length of the latter allowing said prongs to penetrate through the materal of the anchoring ring when subjected to pressure from the flange portions, whereby the outermost portions of said prongs will be anchored in the anchoring ring material, which material is pressed against the surface of the prongs upon the penetration of the latter through the material.

Three embodiments of the invention will be described in the following with reference to the accompanying drawings, the first one of said embodiments being described and illustrated in three dimensional varieties.

In the drawings,

Figs. 1 and 2 illustrate a component part incorporated in the fastener in two different stages of manufacture,

Fig. 3 illustrates another component part incorporated in the fastener in a first stage of manufacture,

Fig. 4 illustrates a third component part incorporated in the fastener,

Fig. 5 illustrates a fourth component part incorporated in the fastener,

Fig. 6 illustrates the fastener in accordance

with th first embodim nt thereof dimensioned for use in canvas of medium thickness,

Fig. 7 sh ws a m dification of th first embodiment, the fastener according t this embodiment being dimensioned for use in thick canvas,

Figs. 8 and 9 show the fastener in accordance with the first embodiment in two different stages of mounting,

Figs. 10 and 11 shows the fastener in accordance with the second embodiment in two different stages of mounting, and

Fig. 12 illustrates the finished and mounted fastener in accordance with the third embodiment thereof dimensioned for a comparatively thin cloth.

All embodiments relate to a reinforcing grommet and all drawing figures are sections through the grommet centres.

Fig. 2 illustrates a gripping ring 1 which is incorporated in the fasteners of all three embodiments. Fig. 1 shows the blank of the intended ring 1, this blank consisting of a comparatively thin sheet metal disc formed with a circular hole 26 therein. The blank which is made from a hard material, preferably stainless steel, is defined by a circular edge 27 which is concentric with the hole, whereby an annular portion, a blank ring 28 of the sheet metal, is formed. From the outer edge 27 project a number of narrow, pointed prongs 3 which are stamped out from the sheet metal in the same manufacturing stage as the rest of the contoured shapes of the device.

In order to bend the ring 1 into the shape illustrated in Fig. 2 the inner part of the blank 28 is folded over outwards to the position shown in Fig. 2 whereas the outer part of the blank 28 is folded over inwards to the position shown in Fig. 2. In this manner one side 30 of the finished ring is formed by the central part of the blank 28 whereas an opposite inner part 31 on the other side of the ring is formed by the inner marginal edge of the blank 28. An outer part 32 on the other side of the ring and like part 31 situated opposite to the surface 30 is formed from the outer marginal edge of the blank 28. The prongs 3 are bent upwards so as to point straight outwards from the side of the ring formed by the parts 31 and 32. Consequently, the prongs will be positioned adjacent to a gap between these two parts. For the sake of clarity the number of prongs shown is limited to six but in practice their number could be considerably greater. They have been shown to extend only from the outer edge 27 but prongs may also be provided at the edge of the hole 26.

For reliable function of the fastener it is important that the prongs 3 are not l cated near the edge of the ring. The prongs may be moved inwards by folding part 32 inwards, which at th sam time strengthens the ring. A corresponding strengthening effect may be achieved by f lding portion 31 inwards as illustrated and this folding operation may be effected als when this portion d es not carry any prongs. However, the folding inwards of a portion which is not provid d with prongs is not absolutely essential, it being quite possible that parts of the ring remain undoubled.

Fig. 3 shows another component part of the fastener, a sleeve 10. It comprises a cylindrical or slightly tapered tubular portion 11, from one end of which projects a collar 12. The collar 12 joins the tubular portion 11 via a small radius portion 13 and merges into a cup-shaped area 14 which at a widening angle in the direction towards its edge 15 is bent axially coextensively with the tubular portion 11. Consequently, the surface of the collar slopes relative to the axial plane. The sleeve 10 is proferably made from stainless steel and from a material point of view it must be compatible with of the anchoring ring 1.

Fig. 4 illustrates a third component part of the device, a supporting ring 17. The ring is relatively thick and has a first, flat face 18 which by rounded edges connects with a cylindrical hole 19 through the ring and with an outer edge 20 of the ring. The opposite face 21 of the ring is arched in such a way that the thickness of the ring diminishes towards the outer edge 20. The surface 21 is connected by rounded edges to the hole 19 and the outer edge 20. The supporting ring 17 must permit the prongs 3 to be pushed through it and hence it must be made of comparatively soft material. A hard plastics, such as amide plastics, therefore is suitable for this purpose, In addition to which plastics material will not give rise to corrosion when used together with the component parts previously mentioned. In certain cases other materials are also feasible, for example a soft light metal or a composite material such as plastics and metal together. The ring 17 is used in all embodiments and variations, apart from that shown in Fig. 12.

Fig. 5 illustrates a fourth component part of the fastener, an anchoring ring 4. This is in the form of a flat ring having a centre hole 5, an outer peripheral edge 6 and an intermediate material web. 7. The material of the ring is harder than the material of ring 17 but softer than the material of ring 1 with its prongs 3. Stainless steel, and a comparatively hard steel, has been suggested as the material of ring 1 and plastics as the material of ring 17. A suitable material for ring 4 is some light metal. Aluminium having a thickness of 0.5—0.8 mm, for example, has proved suitable to use together with the materials mentioned above. However, also stainless steel may be used for the ring 4, provided it is very thin, e.g. 0.2—0.4 mm. In the latter case the prongs need to be somewhat thicker in order to be capable of penetrating the ring 4. In actual practice the material matching involving the use of a thin metal anchoring ring and a thick plastics supp rt ring has pr ved very satisfactory. The metal ring pr vides the required anch rag of the prongs against lateral forces and the plastics ring provides the support required to maintain the outerm st parts of the prongs straight while they are being forced into th substructure and when they are exposed to stress.

All drawing figures 6—12 sh wing the fastener

in its mounted or partly m unted position, also show the material in which the fastener is to b secured, viz. a canvas cloth 22. In accordance with the various mb diments illustrated in Figs. 6—12 the component parts described above may differ somewhat in design, depending mainly on the thickness of the canvas 22 and the greater holding strength required with increased canvas thickness. In spite of these differences, the various component parts of the fastener have been given the same numeral references and so has the canvas 22. This applies also to the edges 23 of a hole punched out in the canvas 22.

In accordance with all embodiments assembly is carried out by passing the rings 4 and 17 over the sleeve 10, ensuring that the latter ring 17 assumes the innermost position with its arched surface 21 abutting against the collar 12. (The fastener according to the embodiment of Fig. 12 has no ring 17.) The tubular portion 11 of the sleeve 10 is thereafter pushed through said hole with the edges 23 which has been punched through the canvas 22. Like the component parts of the fastener the hole in the canvas must be circular. The gripping ring 1 the hole of which has sufficient tolerance for this purpose, is then positioned about the tubular portion. Thus, the ring 1 will be located on one side of the canvas with the prongs 3 directed towards the canvas. On the opposite side of the canvas are located first the ring 4 and then the ring 17. The ring 4 thus rests against the canvas.

When the component parts have been assembled, the flanging of the tubular portion 11 of the sleeve 10 takes place. The flanging is effected in a press in which the collar 14 is supported on a pad whilst a mandrel is introduced into the hole until it reaches the tubular portion 11. In a known manner, the mandrel is formed with a rounded collar which causes flanging of the tubular portion 11 while at the same time the ring 1 is forced towards the collar 14. This presses the prongs 3 initially through the canvas and then through the ring 4 and further into the ring 17.

When they have penetrated the canvas the prongs 3 thus are forced into the ring 4 which they also pierce through on account of their greater hardness/thickness. Since the ring 4 is not formed with predetermined pierce-through points there is no need for alignment of the two rings 1 and 4 relative to one another. This is also true as regards the ring 17 into which the prongs project after having pierced through the ring 4. The prongs 3 will be firmly anchored in the ring 4 because the comparatively soft material of the ring 4 will adhere to the sides of the prongs. Nevertheless, the ring is sufficiently hard not to have a tendency to crack also when th forces to whlch the canvas is subjected are c nsiderable. Th continued penetration of the prongs into the ring 17 provides additional anchorage of the prongs preventing them from bending in a manner that would have made it easy to pull them out of the ring 4. In lighter applications, for instance when the fastener is used in thin canvas, the anchorage force provided by the ring 4 may be sufficient and the ring 17 could be dispensed with, s e Fig. 12. In some cases, see Figs. 6 and 12, th prongs 3 may be all wed to pen trat als through the ring 17, in which case the free ends of the prongs will be bent against the collar 14 on the sleeve 12. By thus matching the anchoring of the prongs to the forces it is possible to obtain the required strength. Actually, the anchorage of the outer portions of the prongs could in this way be made just as firm as the anchorage of the pins in the ring 1, and a bond of even strength thus is obtained.

Consequently, the prongs are supported at both ends by their attachment to and their anchorage in the three rings 1, 4 and 17, which arrangement provides a positive bond.

As shown in Figs. 6 and 7, the rings 1 and 17 form distance pieces for the flanged portions, viz. on the one hand the original collar 12 and on the other the collar formed by the tubular portion 11, the latter designated in the drawing figures by numeral reference 24. In this manner space is provided for the folding inwards of these flanged portions. Also the edge of the collar 12 is folded somewhat inwards in said pad so that the rings 1 and 4 are securely anchored and protected. In spite of this inward folding of the edges, the distance of the edge of the material of the sleeve from the canvas eliminates the risks of the canvas being damaged or cut through by the edges as the latter are pressed downward with considerable force.

In the embodiment illustrated in Figs. 8, 9 the hole with the edge 23 is smaller than the diameter of the tubular portion 11 of the sleeve 10. To ensure that even so it will be possible to thread the canvas onto the portion 11, the edges of the hole have been provided with radial slots, the outer ends of which terminate on a circular line, corresponding approximately to the diameter of portion 11. Thus, when the canvas is threaded onto the tubular portion a projecting edge 25 is formed which in the flanging of the sleeve is folded on top of the ring 1 in the manner illustrated in Fig. 9. This increases the anchorage force further, because owing to the projecting edge the friction bond in the canvas extends over a larger surface area than is the case in the embodiments shown in Figs. 5—7 whilst at the same time the frictional forces are further increased by the friction of the edge against the inner edge of the ring 1.

In the embodiment of Figs. 8, 9 the component parts have been placed in the same sequence as in the case of the embodiment of Figs. 6, 7. However, they can also be placed in the reverse order, as shown in Fig. 10.

The embodiment illustrated in Fig. 12 relates to a relatively thin canvas and a result the forces involved are not s great. Hence, the material of the sleeve 10 can be made comparatively thin and thus mor malleabl . This makes it possible to provide the collars 12 and 23 in th flanging peration with an outwardly bent edge rather than with an inwardly bent edge, which edge runs in

parallel with the canvas 22. With this arrangement and with correct design of the pad and th mandrel, ensuring that no great pressure is exerted on the edg of the collars, there is no risk f the canvas being cut through. Because of this arrangement and also as a result of the reduced forces involved, the ring 17 can be dispensed with as already mentioned. The ring 4, on the other hand, will still be used and the prongs 3 will be forced through the material of the ring during the mounting and assembly of the fastener, as described earlier. Consequently, the prongs 3 will be bent about the canvas, as illustrated in Fig. 4, due to the effect of the slope of the collar 12.

Further variations are also feasible within the scope of the appended claims. For instance, the mbodiment comprising the projecting edge 25 of the canvas 22 may be used also when the component parts are mounted in the sequence appearing from Figs. 6, 7 and 12. Likewise, it is possible to connect at least some of the component parts with each other instead of making them as separate units. It is also feasible to provide the fastener with two rings having prongs thereon, in which case the rings are placed on opposite sides of the material. In the embodiments described a reinforcing grommet has been referred to. However, it is quite possible to design the fastener device in some other way, f r instance so that the collar 12 supports a lock, a bolt or some other anchoring means. The hole which when rings are used is intended for pulling a rope through, may also be used for the attachment f a latch, lock, bolt or other similar device. As mentioned initially, the fastener device in accordance with the invention may also be used for materials other than canvas. For instance, fittings have been attached to plywood and other materials of wood by means of the technique which the present invention aims at improving, and consequently the invention may be used also in applications of this type. As mentioned, the reinforcing grommet in accordance with the specification is circular. The grommet or equivalent device used could however, have elliptical or polygonal shape. Stainless steel and plastics have been mentioned only as examples of possible materials and can be replaced by other materials, such as metals of various kinds.

CLAIMS

1. A fastener, such as a reinforcing grommet, which is particularly intended for cloths, such as canvas, or other thin materials, such as slabs, panels, and the like, and which comprises a preferably tubular portion which is intended to xtend thr ugh a hole formed in the material and flange portions located on either side of the which are arranged to be pressed through the material by the force exerted by said flange portions so that a positiv bond is also obtained, wh rein an anchoring ring is arrang d t be p sitioned on the side of the material opposite the surface provided with said prongs, said ring being made from a material having a hardness and a thickness compared with the material of the prongs and the length of the latter allowing said prongs to penetrate through the material of the anchoring ring when exposed to pressure from the flange portions whereby the outermost portions of said prongs will be anchored in the material of the anchoring ring, which material is pressed against the surface of the prongs upon the penetration of the latter through the material.

2. A fastener as claimed in claim 1, wherein the surface from which said prongs depart is located on a separate ring supported by one of said flange portions.

3. A fastener as claimed in claim 1 or 2, wherein said anchoring ring which is arranged to abut with one of its sides against the material, is arranged to abut with its opposite side against a support ring, which ring is made from a softer and thicker material than the anchoring ring, the outermost portions of said prongs penetrating into said support ring after having pierced through the anchoring ring.

4. A fastener as claimed in claim 3, wherein said prongs are made from a hard material, preferably stainless steel, said anchoring ring is made from a hard material, which is, however, softer than the material of the prongs, preferably a light metal, and said support ring is made from a softer material than the anchoring ring, preferably a comparatively hard plastics, such as amid plastics.

5. A fastener as claimed in claim 3 or 4, wherein the ring on which is positioned said surface having the prongs thereon, said anchoring ring, and said support ring form distance pieces allowing the respective edge portions of said flange portions to be folded against the material without said edge portions penetrating through the surface of said material.

6. A fastener as claimed in any one of the preceding claims, wherein the ring is formed from an annular blank of a thin and malleable material, such as sheet metal, said prongs being formed in said annular blank as needles punched from the material of the blank ring and projecting from at least one of the marginal portions of the latter, and after a marginal portion having been folded over from a portion of said annular blank, which portion constitutes one of the sides of the finished ring, said pins are folded outwards to a position wherein said pins project from the opposite side of the finished ring, said folded-over marginal portion at least partially constituting the opposite side of th finished ring, pr f rably in c njunction with a further, folded opposite marginal portion.

7. A fastener substantially as any her in described with reference to and as illustrated in any of the accompanying drawings.

material, between which flange portions is positi ned an area of said material immediately surrounding said hole formed ther in, an annular surface being arranged to exert pressure on th surfac of said material to form a frictional bond therewith and provided with pin-shaped prongs

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